



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
29.01.2020 Bulletin 2020/05

(51) Int Cl.:
B06B 1/06 (2006.01)

(43) Date of publication A2:
15.01.2020 Bulletin 2020/03

(21) Application number: **19181344.3**

(22) Date of filing: **19.06.2019**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(72) Inventors:
• **KIM, Seung Hyun**
13533 Gyeonggi-do (KR)
• **GU, Jin Ho**
13647 Gyeonggi-do (KR)
• **KIM, Ji Su**
14309 Gyeonggi-do (KR)

(30) Priority: **20.06.2018 KR 20180070806**

(74) Representative: **D'Halleweyn, Nele Veerle Trees Gertrudis et al**
Arnold & Siedsma
Bezuidenhoutseweg 57
2594 AC The Hague (NL)

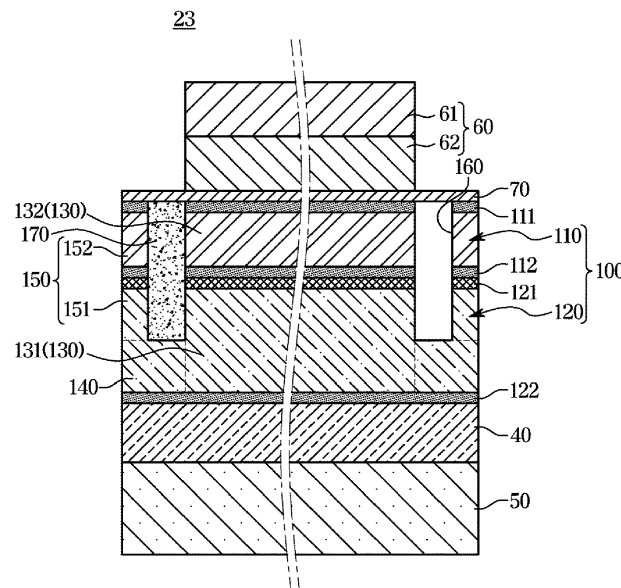
(71) Applicant: **Samsung Medison Co., Ltd.**
Hongcheon-gun, Gangwon-do, 25108 (KR)

(54) **ULTRASONIC PROBE AND MANUFACTURING METHOD THEREOF**

(57) Disclosed are an ultrasonic probe for obtaining an ultrasonic image and a manufacturing method thereof. The ultrasonic probe includes a transducer layer including a piezoelectric layer configured to generate ultrasonic waves and an acoustic layer disposed below the piezoelectric layer, and a matching layer disposed above the

piezoelectric layer, wherein the transducer layer includes an active portion configured to transmit and receive ultrasonic waves, and a stepped portion extending outward from the active portion to prevent cutting damage of the active portion.

FIG. 4





EUROPEAN SEARCH REPORT

 Application Number
 EP 19 18 1344

5

10

15

20

25

30

35

40

45

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2013/169818 A1 (KO HYUN-PHILL [KR] ET AL) 4 July 2013 (2013-07-04)	1-3,5,6,15	INV. B06B1/06
Y	* abstract; figure 3 * * paragraphs [0003], [0026], [0027], [0031] - [0036], [0043], [0059] - [0061] *	7-14	
X	WO 2014/185557 A1 (ALPINION MEDICAL SYSTEMS CO [KR]) 20 November 2014 (2014-11-20)	1-3,5-7,10-12,15	
Y	* abstract; figures 4,9 * * paragraphs [0018] - [0021], [0024], [0032], [0037], [0045] *	8,9	
X	US 2015/051493 A1 (GU JIN-HO [KR] ET AL) 19 February 2015 (2015-02-19)	1-6,15	
	* abstract; figures 5A-5F * * paragraphs [0003], [0015], [0061], [0071] - [0076] *		
X	US 2017/307756 A1 (LEE WON-SEOK [KR]) 26 October 2017 (2017-10-26)	1-7,10-12,15	TECHNICAL FIELDS SEARCHED (IPC)
Y	* abstract; figure 1 * * paragraphs [0030], [0032], [0039] - [0044] *	8,9,13,14	B06B
Y	US 2017/059378 A1 (NAGAREDA KENJI [JP] ET AL) 2 March 2017 (2017-03-02)	7-12,14	
	* abstract; figure 11 * * paragraph [0083] *		
Y	US 2014/338455 A1 (WADA TAKATSUGU [JP] ET AL) 20 November 2014 (2014-11-20)	13	
	* abstract; figures 1,2,3D *		
A	US 2014/139072 A1 (SUDOL WOJTEK [US]) 22 May 2014 (2014-05-22)	4	
	* paragraph [0045] *		
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 December 2019	Examiner de Jong, Frank
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.02 (P04C01)

50

55

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 18 1344

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-12-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013169818 A1	04-07-2013	CN 103181786 A	03-07-2013
		EP 2610861 A2	03-07-2013
		KR 20130078972 A	10-07-2013
		US 2013169818 A1	04-07-2013
WO 2014185557 A1	20-11-2014	KR 20140134056 A	21-11-2014
		WO 2014185557 A1	20-11-2014
US 2015051493 A1	19-02-2015	EP 2839887 A2	25-02-2015
		KR 20150020945 A	27-02-2015
		US 2015051493 A1	19-02-2015
US 2017307756 A1	26-10-2017	CN 107005768 A	01-08-2017
		US 2017307756 A1	26-10-2017
		WO 2016104820 A1	30-06-2016
US 2017059378 A1	02-03-2017	CN 103703793 A	02-04-2014
		DE 112012001935 T5	10-07-2014
		JP 5433910 B1	05-03-2014
		JP WO2014002286 A1	30-05-2016
		KR 20140012949 A	04-02-2014
		US 2015042210 A1	12-02-2015
		US 2017059378 A1	02-03-2017
		WO 2014002286 A1	03-01-2014
US 2014338455 A1	20-11-2014	CN 104105447 A	15-10-2014
		EP 2813184 A1	17-12-2014
		JP 5881582 B2	09-03-2016
		JP 2013176537 A	09-09-2013
		US 2014338455 A1	20-11-2014
		WO 2013118768 A1	15-08-2013
US 2014139072 A1	22-05-2014	CN 103635264 A	12-03-2014
		EP 2723506 A1	30-04-2014
		JP 6388536 B2	12-09-2018
		JP 2014523689 A	11-09-2014
		US 2014139072 A1	22-05-2014
		WO 2013001448 A1	03-01-2013

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82